

CLAIMS

I Claim:

- 1 1. A method of any speed dubbing using isochronous data packets comprising:
 - 2 a. configuring a transmitting plug on a transmitting device for transmitting
 - 3 isochronous data packets in non real-time;
 - 4 b. configuring a receiving plug on a receiving device for receiving the isochronous
 - 5 data packets received in non real-time;
 - 6 c. packetizing a data stream into the isochronous data packets configured for non
 - 7 real-time transmission, thereby forming a stream of non real-time isochronous
 - 8 data packets; and
 - 9 d. transmitting the non real-time isochronous data packets from the transmitting
 - 10 device via the transmitting plug to the receiving device via the receiving plug.
- 1 2. The method according to Claim 1 wherein the stream of non real-time isochronous data
2 packets is formed by packetizing the data stream into real-time isochronous data packets
3 and encapsulating one or more real-time isochronous data packets within a non real-time
4 header to form each non real-time isochronous data packet within the stream of non real-
5 time isochronous data packets, further wherein the number of real-time isochronous data
6 packets encapsulated within each non real-time isochronous data packet is associated
7 with a non real-time transmission speed of the stream of non real-time isochronous data
8 packets.
- 1 3. The method according to Claim 2 wherein if the non real-time transmission speed is
2 greater than real-time, then the non-real time transmission speed is a multiple of the real-
3 time transmission speed and the number of real-time isochronous data packets

4 encapsulated within each non real-time isochronous data packet corresponds to the
5 multiple.

1 4. The method according to Claim 2 wherein if the non real-time transmission speed is less
2 than real-time then a single real-time isochronous data packet is encapsulated within each
3 non real-time isochronous data packet such that only a portion of the data originally
4 contained within the single real-time isochronous data packet is included within the
5 encapsulated non real-time isochronous data packet, and a remaining portion of the data
6 originally contained within the single real-time isochronous data packet is encapsulated in
7 one or more subsequent non real-time isochronous data packets.

1 5. The method according to Claim 2 wherein the non real-time header includes a non real-
2 time isochronous header and a non real-time CIP header.

1 6. The method according to Claim 5 wherein the non real-time isochronous header includes
2 a data length field for indicating the amount of data contained within the non real-time
3 isochronous data packet.

1 7. The method as claimed in Claim 5 wherein the non real-time CIP header includes a
2 format field for indicating that the non real-time isochronous data packet is formatted for
3 non real-time data transfer.

1 8. The method according to Claim 1 wherein the data stream includes audio/visual content
2 data.

1 9. The method according to Claim 1 wherein the non real-time isochronous data packets are
2 transmitted in non real-time over an isochronous channel.

1 10. The method according to claim 1 wherein the non real-time isochronous data packets are
2 transmitted in non real-time over an asynchronous stream.

1 11. A method of transmitting isochronous data packets in non real-time comprising:
2 a. configuring a source plug of a source device for transmitting isochronous data
3 packets in non real-time;
4 b. packetizing a data stream into real-time isochronous data packets;
5 c. determining a transmission speed of the isochronous data packets to be
6 transmitted;
7 d. encapsulating a selective one of a partial real-time isochronous data packet and
8 multiple real-time isochronous data packets within a non real-time isochronous
9 data packet, wherein a number of encapsulated real-time isochronous data packets
10 is based on the transmission speed; and
11 e. transmitting the non real-time isochronous data packets via the source plug.

1 12. The method according to Claim 11 wherein if the transmission speed is greater than real-
2 time, then multiple real-time isochronous data packets are encapsulated within the non
3 real-time isochronous data packet.

1 13. The method according to Claim 11 wherein if the transmission speed is less than real-
2 time, then a partial real-time isochronous data packet is encapsulated within the non real-
3 time isochronous data packet and a remaining portion of the real-time isochronous data
4 packet is encapsulated in one or more subsequent non real-time isochronous data packets.

1 14. The method according to Claim 11 wherein each non real-time isochronous data packet
2 includes a non real-time isochronous header and a non real-time CIP header.

1 15. The method according to Claim 14 wherein the non real-time isochronous header
2 includes a data length field for indicating the amount of data contained within the non
3 real-time isochronous data packet.

1 16. The method as claimed in Claim 14 wherein the non real-time CIP header includes a
2 format field for indicating that the non real-time isochronous data packet is formatted for
3 non real-time data transfer.

1 17. The method according to Claim 11 wherein the data stream includes audio/visual content
2 data.

1 18. The method according to Claim 11 wherein the non real-time isochronous data packets
2 are transmitted in non real-time over an isochronous channel.

1 19. The method according to claim 11 wherein the non real-time isochronous data packets are
2 transmitted in non real-time over an asynchronous stream.

1 20. A method of receiving isochronous data packets in non real-time comprising:
2 a. configuring a destination plug of a destination device for receiving isochronous
3 data packets in non real-time;
4 b. receiving isochronous data packets over the destination plug;
5 c. determining a format of the received isochronous data packets;
6 d. if the format indicates that the received isochronous data packets are non real-time
7 isochronous data packets, then determining a transmission speed of the non real-
8 time isochronous data packets;
9 e. isolating a selective one of a partial real-time isochronous data packet and

- multiple real-time isochronous data packets encapsulated within the non real-time isochronous data packet, wherein a number of real-time isochronous data packets is based upon the transmission speed; and
- f. processing the real-time isochronous data packets.

21. The method according to Claim 20 wherein if a partial real-time isochronous data packet is encapsulated within the non real-time isochronous data packet, then a remaining portion of the real-time isochronous data packet is encapsulated in one or more subsequent non real-time isochronous data packets, and the remaining portion is collected and aggregated with the partial real-time isochronous data packet before processing.

22. The method according to Claim 20 wherein each non real-time isochronous data packet includes a non real-time isochronous header and a non real-time CIP header.

23. The method according to Claim 22 wherein the non real-time isochronous header includes a data length field for indicating the amount of data contained within the non real-time isochronous data packet.

24. The method as claimed in Claim 22 wherein the non real-time CIP header includes a format field for indicating that the non real-time isochronous data packet is formatted for non real-time data transfer.

25. The method according to Claim 20 wherein the data stream includes audio/visual content data.

26. A method of configuring a plug to support non real-time streams of isochronous data packets comprising:

- a. embedding a non real-time plug transfer information block within a plug configuration information block;
- b. defining a non real-time information type within the non real-time plug transfer information block, wherein the non real-time information type indicates a non real-time stream of isochronous data packets;
- c. setting a bandwidth value within the non real-time plug transfer information block corresponding to a bus bandwidth of the non real-time stream of isochronous data packets; and
- d. setting an enable field within the non real-time plug transfer information block to enable the plug to support non real-time streams of isochronous data packets.

27. An apparatus for communicating isochronous data packets in non real-time comprising:
- a. a configuring circuit to configure a plug to communicate isochronous data packets in non real-time;
 - b. a packetizing circuit to packetize a data stream into isochronous data packets configured for non real-time transmission, thereby forming a stream of non real-time isochronous data packets;
 - c. a transceiver circuit configured to communicate isochronous data packets in non real-time via the plug;
 - d. a de-packetizing circuit to extract one or more real-time isochronous data packets encapsulated within each non real-time isochronous data packet; and
 - e. a controller coupled to the configuring circuit, the packetizing circuit, the transceiver circuit, and the de-packetizing circuit, wherein the controller processes the extracted real-time isochronous data packets.

28. The apparatus according to Claim 27 wherein the stream of non real-time isochronous data packets is formed by packetizing the data stream into real-time isochronous data

3 packets and encapsulating one or more real-time isochronous data packets within a non
4 real-time header to form each non real-time isochronous data packet within the stream of
5 non real-time isochronous data packets, further wherein the number of real-time
6 isochronous data packets encapsulated within each non real-time isochronous data packet
7 is associated with a non real-time transmission speed of the stream of non real-time
8 isochronous data packets.

1 29. The apparatus according to Claim 28 wherein if the non real-time transmission speed is
2 greater than real-time, then the non-real time transmission speed is a multiple of the real-
3 time transmission speed and the number of real-time isochronous data packets
4 encapsulated within each non real-time isochronous data packet corresponds to the
5 multiple.

1 30. The apparatus according to Claim 28 wherein if the non real-time transmission speed is
2 less than real-time then a single real-time isochronous data packet is encapsulated within
3 each non real-time isochronous data packet such that only a portion of the data originally
4 contained within the single real-time isochronous data packet is included within the
5 encapsulated non real-time isochronous data packet, and a remaining portion of the data
6 originally contained within the single real-time isochronous data packet is encapsulated in
7 one or more subsequent non real-time isochronous data packets.

1 31. The apparatus according to Claim 28 wherein the non real-time header includes a non
2 real-time isochronous header and a non real-time CIP header.

1 32. The apparatus according to Claim 31 wherein the non real-time isochronous header
2 includes a data length field for indicating the amount of data contained within the non
3 real-time isochronous data packet.

- 1 33. The apparatus as claimed in Claim 31 wherein the non real-time CIP header includes a
2 format field for indicating that the non real-time isochronous data packet is formatted for
3 non real-time data transfer.
- 1 34. The apparatus according to Claim 27 wherein the data stream includes audio/visual
2 content data.
- 1 35. The apparatus according to Claim 27 wherein the non real-time isochronous data packets
2 are transmitted in non real-time over an isochronous channel.
- 1 36. The apparatus according to claim 27 wherein the non real-time isochronous data packets
2 are transmitted in non real-time over an asynchronous stream.
- 1 37. The apparatus according to claim 27 wherein if a partial real-time isochronous data
2 packet is encapsulated within the non real-time isochronous data packet, then a remaining
3 portion of the real-time isochronous data packet is encapsulated in one or more
4 subsequent non real-time isochronous data packets, and the remaining portion is collected
5 and aggregated with the partial real-time isochronous data packet before processing.
- 1 38. The apparatus according to claim 27 wherein the transceiver circuit is configured to
2 transmit isochronous data packets in non real-time via the plug.
- 1 39. The apparatus according to claim 27 wherein the transceiver circuit is configured to
2 receive isochronous data packets in non real-time via the plug.
- 1 40. An apparatus for communicating isochronous data packets in non real-time comprising:

- 2 a. means for configuring a plug to communicate isochronous data packets in non
3 real-time;
4 b. means for packetizing a data stream into isochronous data packets configured for
5 non real-time transmission, thereby forming a stream of non real-time isochronous
6 data packets;
7 c. means for communicating isochronous data packets in non real-time via the plug;
8 d. means for extracting one or more real-time isochronous data packets encapsulated
9 within each non real-time isochronous data packet, wherein a number of real-time
10 isochronous data packets is based upon the transmission speed; and
11 e. means for controlling coupled to the means for configuring, the means for
12 packetizing, the means for communicating, and the means for de-packetizing,
13 wherein the means for controlling processes the extracted real-time isochronous
14 data packets.

1 41. The apparatus according to Claim 40 wherein the stream of non real-time isochronous
2 data packets is formed by packetizing the data stream into real-time isochronous data
3 packets and encapsulating one or more real-time isochronous data packets within a non
4 real-time header to form each non real-time isochronous data packet within the stream of
5 non real-time isochronous data packets, further wherein the number of real-time
6 isochronous data packets encapsulated within each non real-time isochronous data packet
7 is associated with a non real-time transmission speed of the stream of non real-time
8 isochronous data packets.

1 42. The apparatus according to Claim 41 wherein if the non real-time transmission speed is
2 greater than real-time, then the non-real time transmission speed is a multiple of the real-
3 time transmission speed and the number of real-time isochronous data packets
4 encapsulated within each non real-time isochronous data packet corresponds to the

multiple.

43. The apparatus according to Claim 41 wherein if the non real-time transmission speed is less than real-time then a single real-time isochronous data packet is encapsulated within each non real-time isochronous data packet such that only a portion of the data originally contained within the single real-time isochronous data packet is included within the encapsulated non real-time isochronous data packet, and a remaining portion of the data originally contained within the single real-time isochronous data packet is encapsulated in one or more subsequent non real-time isochronous data packets.

44. The apparatus according to Claim 41 wherein the non real-time header includes a non real-time isochronous header and a non real-time CIP header.

45. The apparatus according to Claim 44 wherein the non real-time isochronous header includes a data length field for indicating the amount of data contained within the non real-time isochronous data packet.

46. The apparatus as claimed in Claim 44 wherein the non real-time CIP header includes a format field for indicating that the non real-time isochronous data packet is formatted for non real-time data transfer.

47. The apparatus according to Claim 40 wherein the data stream includes audio/visual content data.

48. The apparatus according to Claim 40 wherein the non real-time isochronous data packets are transmitted in non real-time over an isochronous channel.

- 1 49. The apparatus according to claim 40 wherein the non real-time isochronous data packets
2 are transmitted in non real-time over an asynchronous stream.
- 1 50. The apparatus according to claim 40 wherein if a partial real-time isochronous data
2 packet is encapsulated within the non real-time isochronous data packet, then a remaining
3 portion of the real-time isochronous data packet is encapsulated in one or more
4 subsequent non real-time isochronous data packets, and the remaining portion is collected
5 and aggregated with the partial real-time isochronous data packet before processing.
- 1 51. The apparatus according to claim 40 wherein the means for communicating is configured
2 to transmit isochronous data packets in non real-time via the plug.
- 1 52. The apparatus according to claim 40 wherein the means for communicating is configured
2 to receive isochronous data packets in non real-time via the plug.